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CLAIMS

1. A spindle for a grinding wheel which is to grind re-entrant cams on camshafts comprising a shaft at one end of which is mounted the grinding wheel, drive means for driving the other end of the shaft, and a rigid elongate casing extending axially from the drive means and encasing the shaft, characterised in that the drive means is an electric motor, and in that the length of the shaft and casing is selected to be at least as long as the axial length of a camshaft to be ground by the wheel, the shaft being carried in three hydrostatic bearings, one of which is located near said one end of the shaft so as to be at the end of the rigid casing remote from the motor, thereby to increase the shaft stiffness and increase its resistance to bending, the two other bearings disposed on opposite sides of the motor.

2. A spindle as claimed in claim 1 wherein the second bearing is located at the inboard end of the external part of the shaft, and the third bearing is located within the motor at said other end of the shaft.

3. A spindle as claimed in claim 1 or claim 2 wherein the stator of the motor is secured within a rigid housing and the non-rotating element of each of the three bearings is secured within either the rigid elongate casing or the rigid motor housing.

4. A spindle as claimed in claim 2 or claim 3 wherein the axial length of the part of the shaft which carries the rotor of the motor is shorter than the external part of the shaft, the shaft being constructed so that the stiffness and the support of the shorter part of the shaft situated between the second and third bearings dictate that the bending resonance of the longer external part is above the critical spindle rotational frequency.

5. A spindle as claimed in any one of claims 1 to 4 in which a symmetrical design of housing is employed for the motor.

6. A spindle as claimed in claim 5 wherein the motor housing includes a water cooling jacket in which water is forced to follow a helical path around the motor, so as to avoid cooling one side of the motor more than another.

7. A spindle as claimed in any one of claims 1 to 6 wherein the spindle is constructed to be axisymmetrical, so that any heat generated within the bearings dissipates radially into the surrounding material in a uniform manner, so that in use the spindle casing will tend to warm up and cool down uniformly, and therefore expand and contract uniformly.

8. A spindle as claimed in any one of claims 1 to 7 in which, in use, oil is supplied under pressure to the bearings by a pump which draws oil from a reservoir to which oil returns from the bearings.

9. A spindle as claimed in claim 8 comprising an enclosure formed by the rigid casing and a housing for the motor, wherein oil heated in use in each bearing drains into the lower regions of the enclosure and can thereby become heated to a higher temperature then the upper regions thereof.

10. A spindle as claimed in claim 9 wherein the lower regions of the enclosure are formed as a separate oil collection box which is mounted to the remainder of the enclosure in such a manner that it will not impart a strain on the spindle shaft.

11. A spindle as claimed in claim 9 or claim 10 wherein a thermal barrier is provided between the said lower regions and the remainder of the enclosure to reduce the transfer of heat from the hot oil to the upper regions of the enclosure and thereby prevent thermally induced misalignment of the three bearings and any strain on the spindle shaft caused by any such misalignment.

12. A method of constructing a spindle as claimed in claim 2 wherein during assembly the internal bores of two of the bearings are initially aligned and the third bearing is adjusted radially to bring all three bores into alignment.